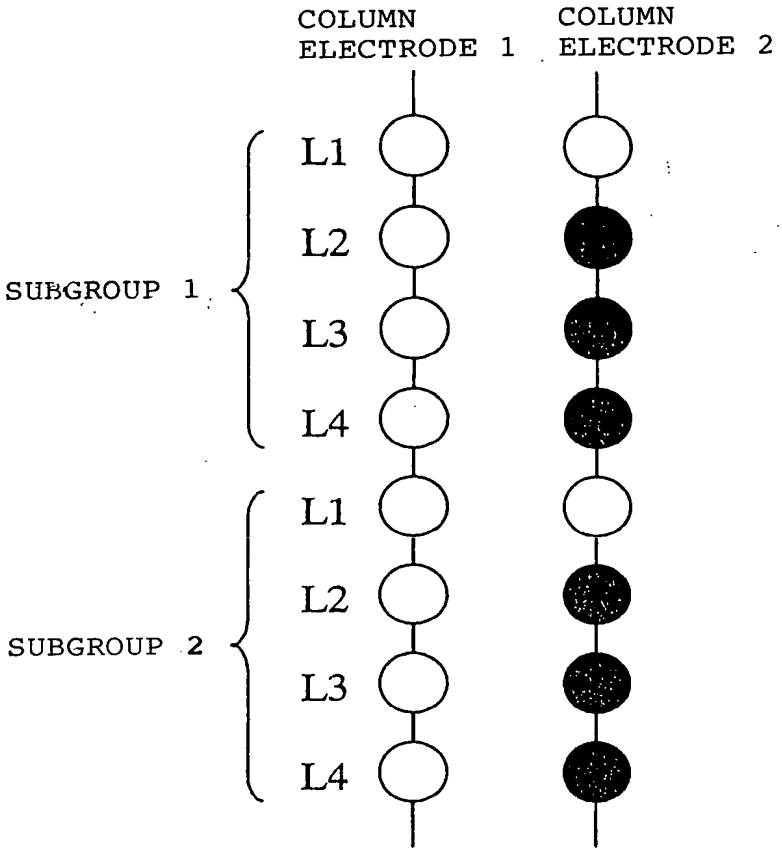


Fig. 1

4 x 4 HADAMARD'S MATRIX (A)

L=1	1	1	1	1
L=2	1	-1	1	-1
L=3	1	1	-1	-1
L=4	1	-1	-1	1

Fig. 2

COLUMN ELECTRODE 1

VECTOR (d) (-1 -1 -1 -1)
VECTOR (v) (-4 0 0 0)

COLUMN ELECTRODE 2

VECTOR (d) (-1 1 1 1)
VECTOR (v) (2 -2 -2 -2)

Fig. 3

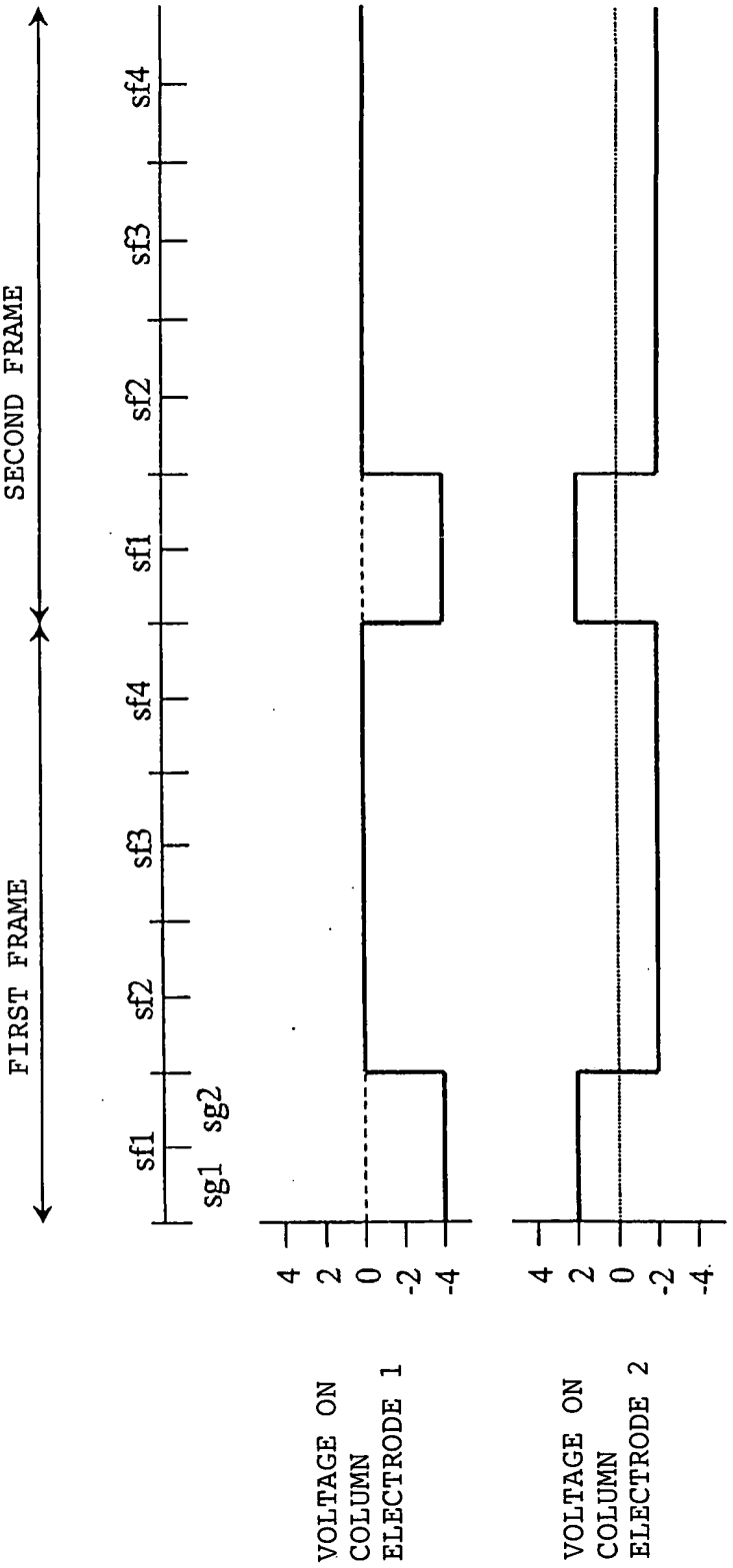

FIRST FRAME
SECOND FRAME
sf1
sf2
sf3
sf4
sf1
sf2
sf3
sf4
sg1
sg2
VOLTAGE ON COLUMN ELECTRODE 1
VOLTAGE ON COLUMN ELECTRODE 2
4
2
0
-2
-4

Fig. 4

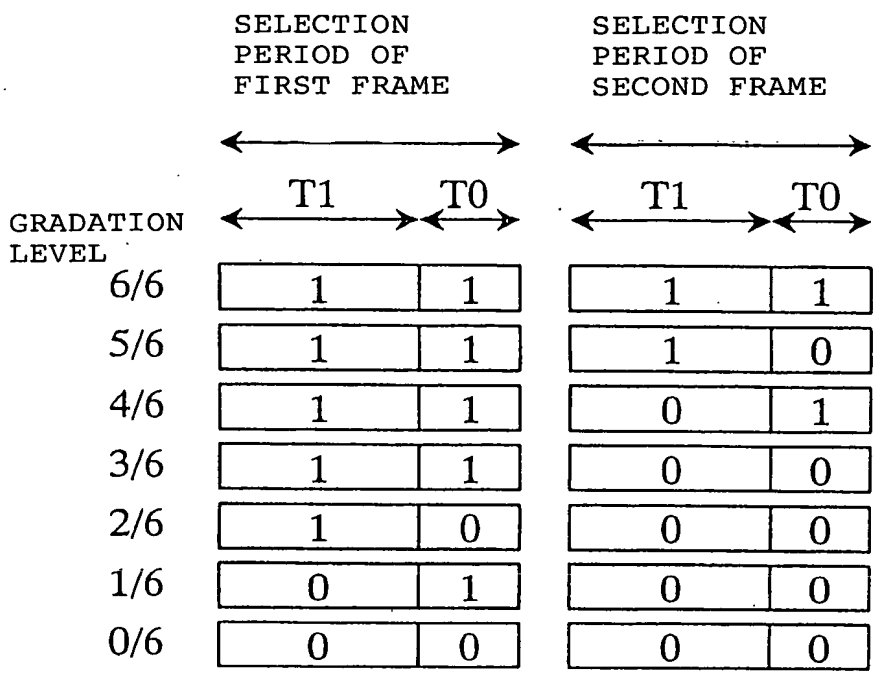

SELECTION PERIOD OF FIRST FRAME
SELECTION PERIOD OF SECOND FRAME
T1
T0
T1
T0
GRADATION LEVEL
6/6 1 1 1 1
5/6 1 1 1 0
4/6 1 1 0 1
3/6 1 1 0 0
2/6 1 0 0 0
1/6 0 1 0 0
0/6 0 0 0 0

Fig. 5

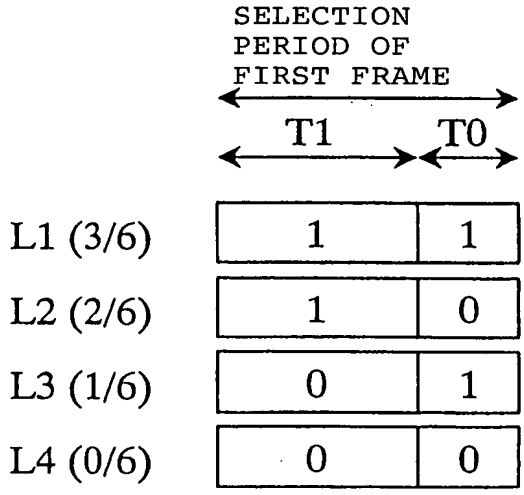

SELECTION PERIOD OF FIRST FRAME
T1
T0
L1 (3/6) 1 1
L2 (2/6) 1 0
L3 (1/6) 0 1
L4 (0/6) 0 0

Fig. 6

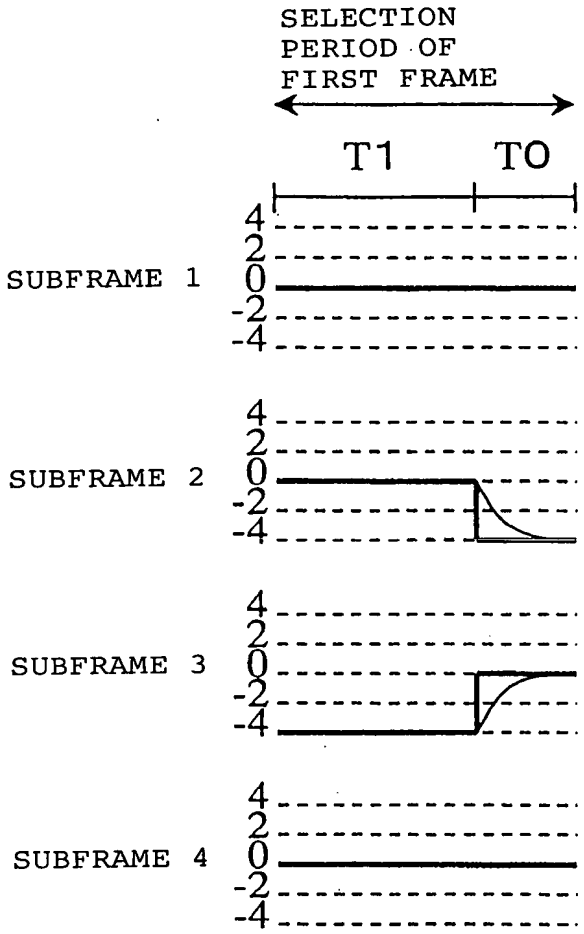

SELECTION
PERIOD OF
FIRST FRAME
T1
T0
SUBFRAME 1
SUBFRAME 2
SUBFRAME 3
SUBFRAME 4
4
2
0
-2
-4

Fig. 7

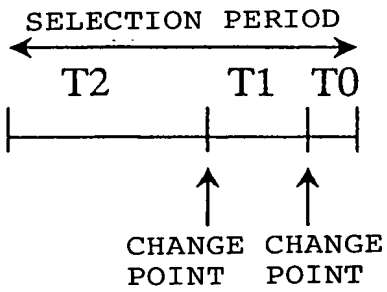

SELECTION PERIOD
T2
T1
T0
CHANGE POINT
CHANGE POINT

Fig. 8

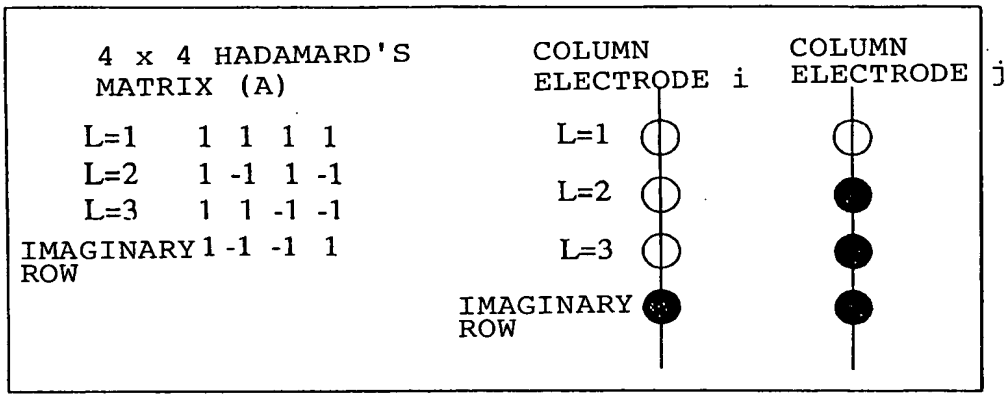


Fig. 9A

COLUMN ELECTRODE i
VECTOR (d) (-1 -1 -1 1)
VECTOR (v) (-2 -2 -2 2)

COLUMN ELECTRODE j
VECTOR (d) (-1 1 1 1)
VECTOR (v) (2 -2 -2 -2)

Fig. 9B

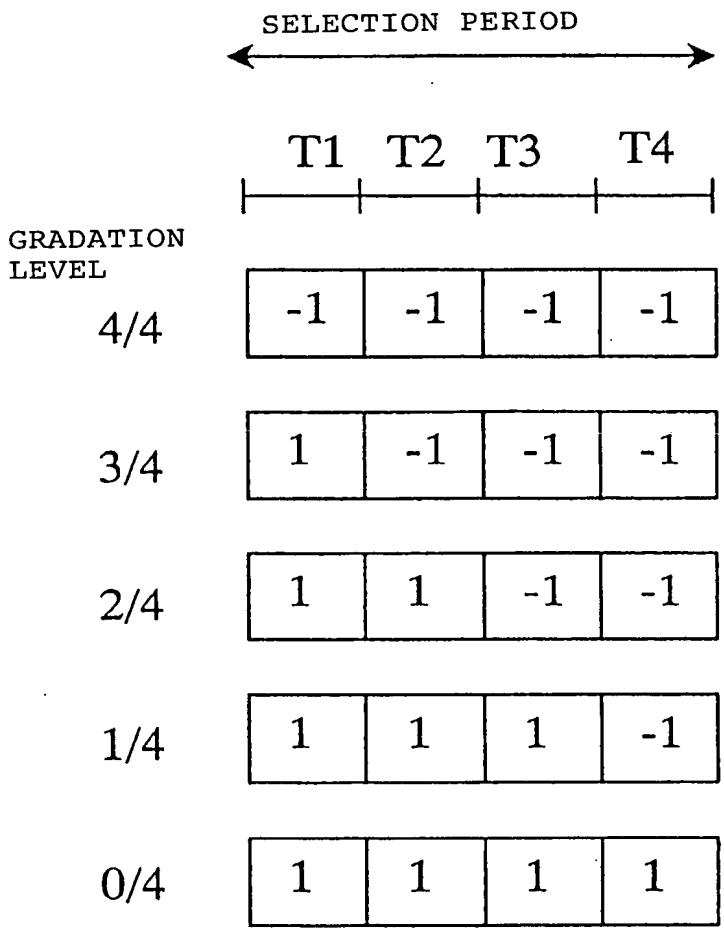

SELECTION PERIOD
T1
T2
T3
T4
GRADATION LEVEL
4/4
-1
-1
-1
-1
3/4
1
-1
-1
-1
2/4
1
1
-1
-1
1/4
1
1
1
-1
0/4
1
1
1
1

Fig. 10

	T1	T2	T3	T4
L1 (3/4 GRADATION LEVEL)	1	-1	-1	-1
L2 (2/4 GRADATION LEVEL)	1	1	-1	-1
L3 (1/4 GRADATION LEVEL)	1	1	1	-1
IMAGINARY ROW	-1	1	-1	1

Fig. 11A

	T1	T2	T3	T4
FIRST SELECTION	2	2	-2	-2
SECOND SELECTION	2	-2	2	-2
THIRD SELECTION	2	-2	-2	-2
FOURTH SELECTION	-2	-2	-2	2

Fig. 11B

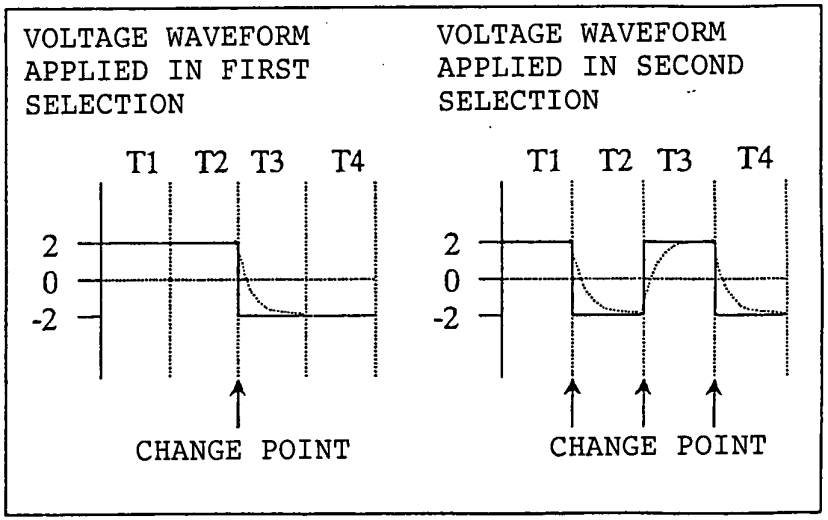


Fig. 11C

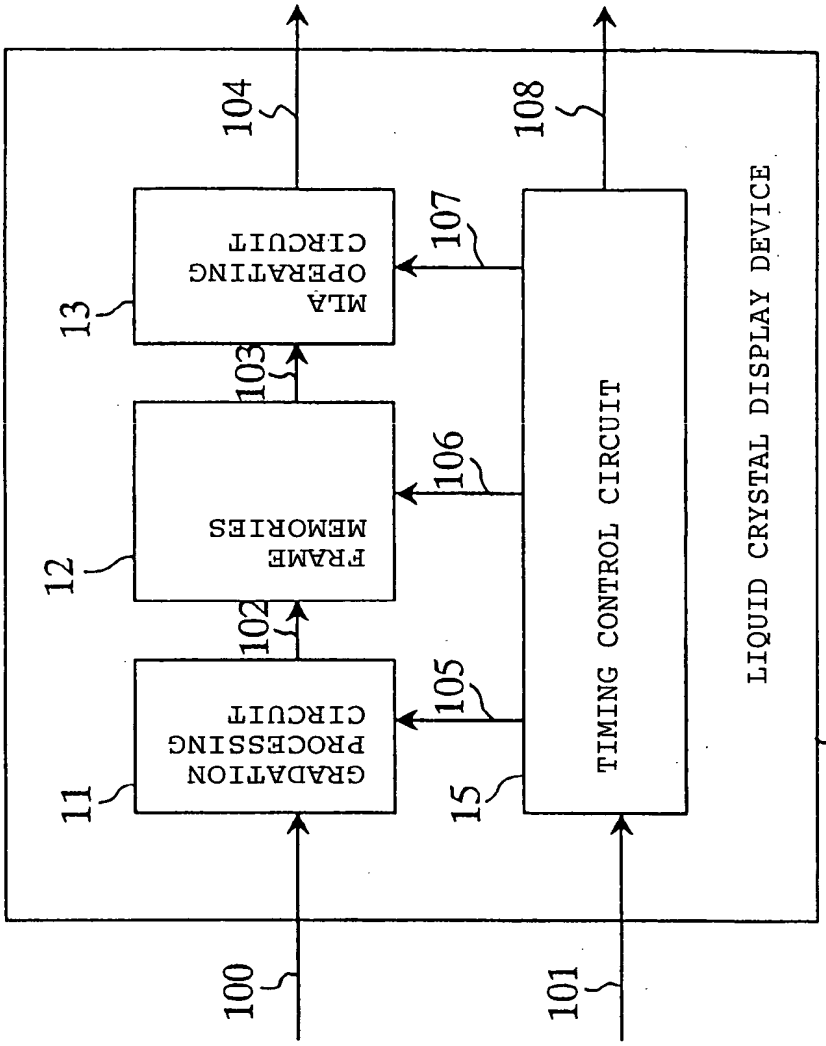

LIQUID CRYSTAL DISPLAY DEVICE
10
GRADATION PROCESSING CIRCUIT
11
FRAME MEMORIES
12
MLA OPERATING CIRCUIT
13
TIMING CONTROL CIRCUIT
15
100
101
102
103
104
105
106
107
108

Fig. 12

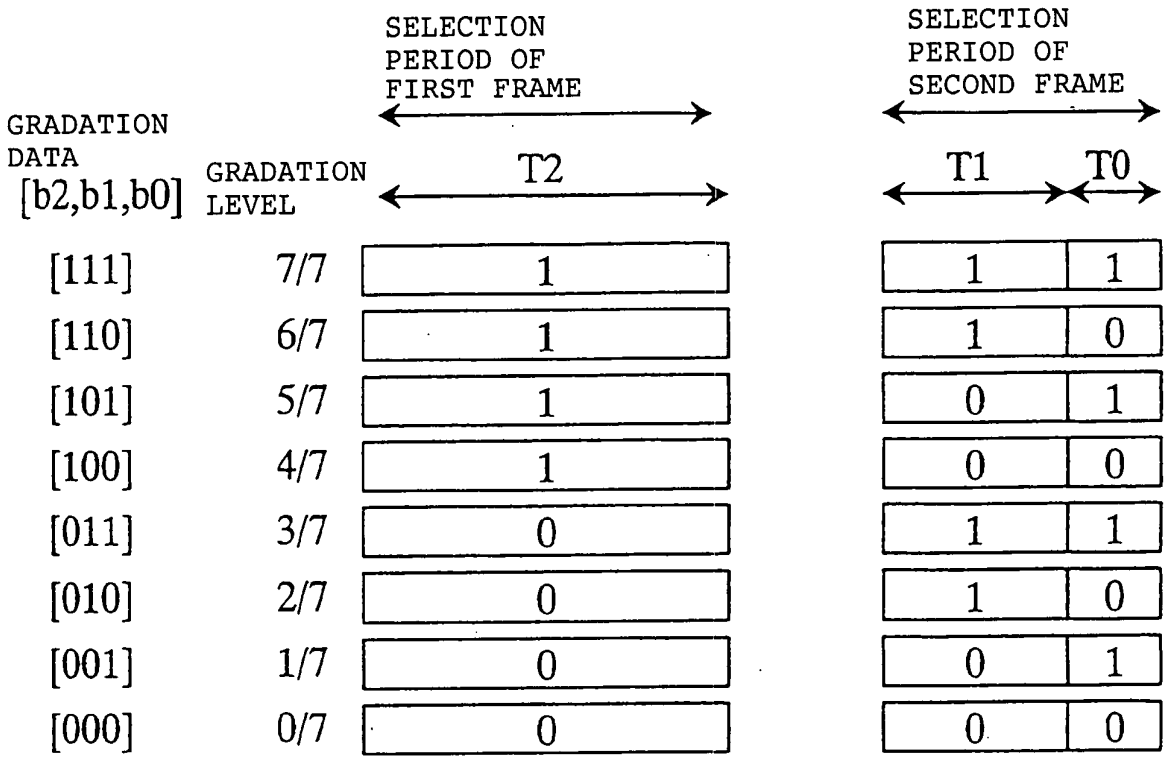
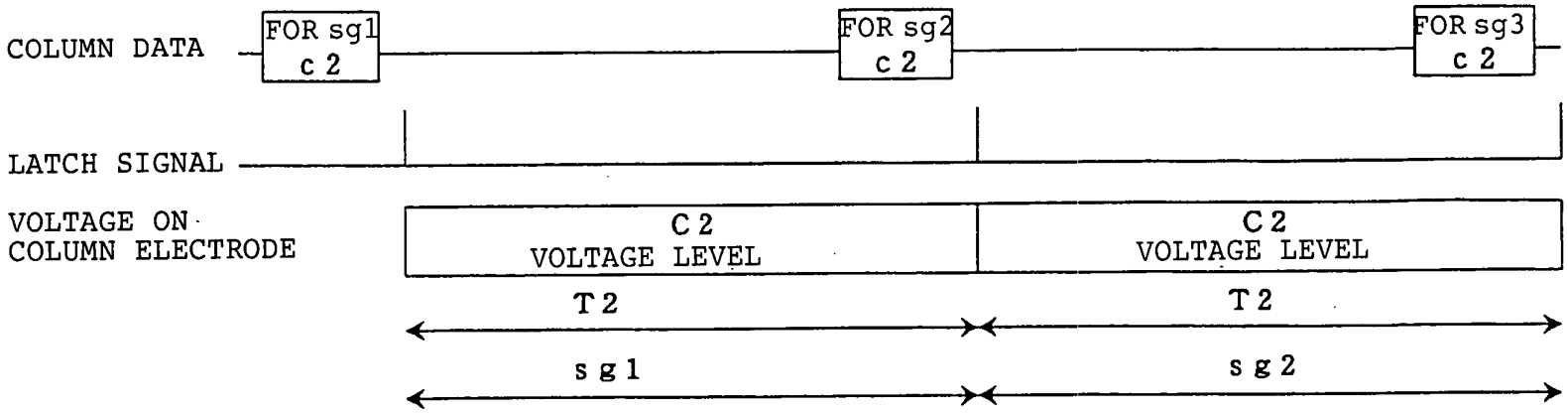


Fig. 13

(TIMING OF LATCH SIGNAL IN FIRST FRAME)



(TIMING OF LATCH SIGNAL IN SECOND FRAME)

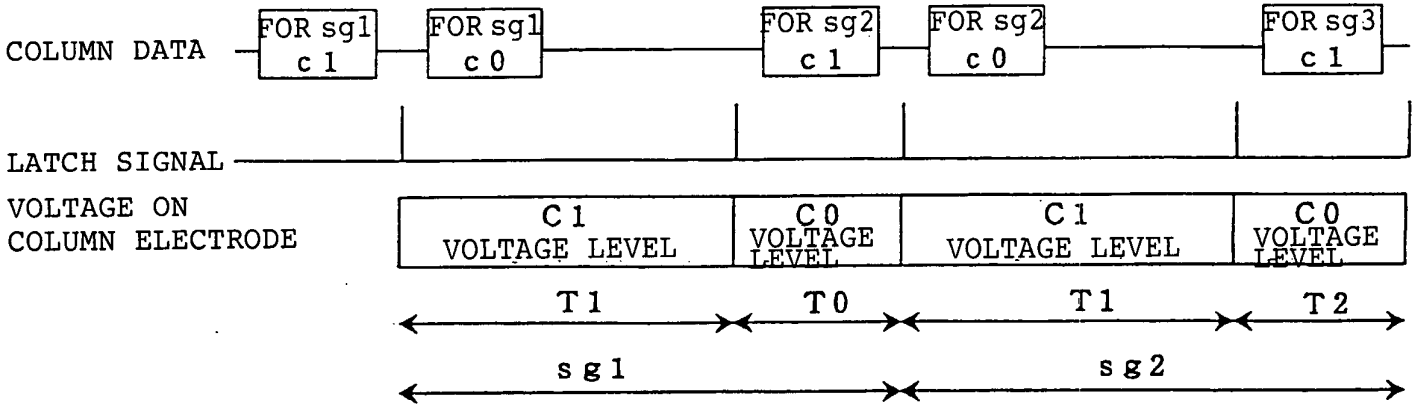


Fig. 14

GRADATION DATA [b2,b1,b0]	GRADATION LEVEL	SELECTION PERIOD OF FIRST FRAME		SELECTION PERIOD OF SECOND FRAME	
		T3	T0	T2	T1
[1111]	15/15	1	1	1	1
[1100]	14/15	1	0	1	1
[1101]	13/15	1	1	1	0
[1100]	12/15	1	0	1	0
[1011]	11/15	1	1	0	1
[1010]	10/15	1	0	0	1
[1001]	9/15	1	1	0	0
[1000]	8/15	1	0	0	0
[0111]	7/15	0	1	1	1
[0110]	6/15	0	0	1	1
[0101]	5/15	0	1	1	0
[0100]	4/15	0	0	1	0
[0011]	3/15	0	1	0	1
[0010]	2/15	0	0	0	1
[0001]	1/15	0	1	0	0
[0000]	0/15	0	0	0	0

Fig. 15

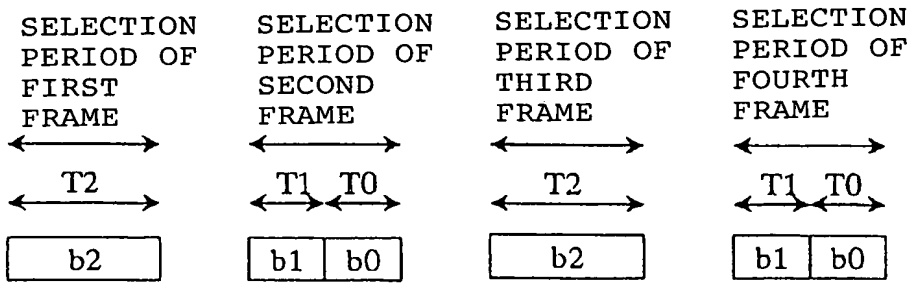


Fig. 16

GRADATION NUMBER	f1	f2		f3	f4		
	T2	T1	T0	T2	T1	T0	GRADATION LEVEL
0	0	0	0	0	0	0	0 /20
1	0	0	1	0	0	0	1 /20
2	0	0	1	0	0	1	2 /20
3	0	1	0	0	0	0	3 /20
4	0	1	1	0	0	0	4 /20
5	0	1	1	0	0	1	5 /20
6	1	0	0	0	0	0	6 /20
7	1	0	1	0	0	0	7 /20
8	1	0	1	0	0	1	8 /20
9	1	1	0	0	0	0	9 /20
10	1	1	1	0	0	0	10 /20
11	1	1	1	0	0	1	11 /20
12	1	1	0	0	1	0	12 /20
13	1	1	1	0	1	0	13 /20
14	1	1	1	0	1	1	14 /20
15	1	1	0	1	0	0	15 /20
16	1	1	1	1	0	0	16 /20
17	1	1	1	1	0	1	17 /20
18	1	1	0	1	1	0	18 /20
19	1	1	1	1	1	0	19 /20
20	1	1	1	1	1	1	20 /20

Fig. 17

GRADATION NUMBER	f1	f2		f3	f4		
	T2	T1	T0	T2	T1	T0	GRADTION LEVEL
0	0	0	0	0	0	0	0 /20
1	0	0	1	0	0	0	2 /20
2	0	1	0	0	0	0	3 /20
3	0	0	1	0	0	1	4 /20
4	0	1	1	0	0	0	5 /20
5	1	0	0	0	0	0	6 /20
6	0	1	1	0	0	1	7 /20
7	1	0	1	0	0	0	8 /20
8	1	1	0	0	0	0	9 /20
9	1	0	1	0	0	1	10 /20
10	1	1	1	0	0	0	11 /20
11	1	1	0	0	1	0	12 /20
12	1	1	1	0	0	1	13 /20
13	1	1	1	0	1	0	14 /20
14	1	1	0	1	0	0	15 /20
15	1	1	1	0	1	1	16 /20
16	1	1	1	1	0	0	17 /20
17	1	1	0	1	1	0	18 /20
18	1	1	1	1	0	1	19 /20
19	1	1	1	1	1	0	20 /20
20	1	1	1	1	1	1	22 /20

Fig. 18

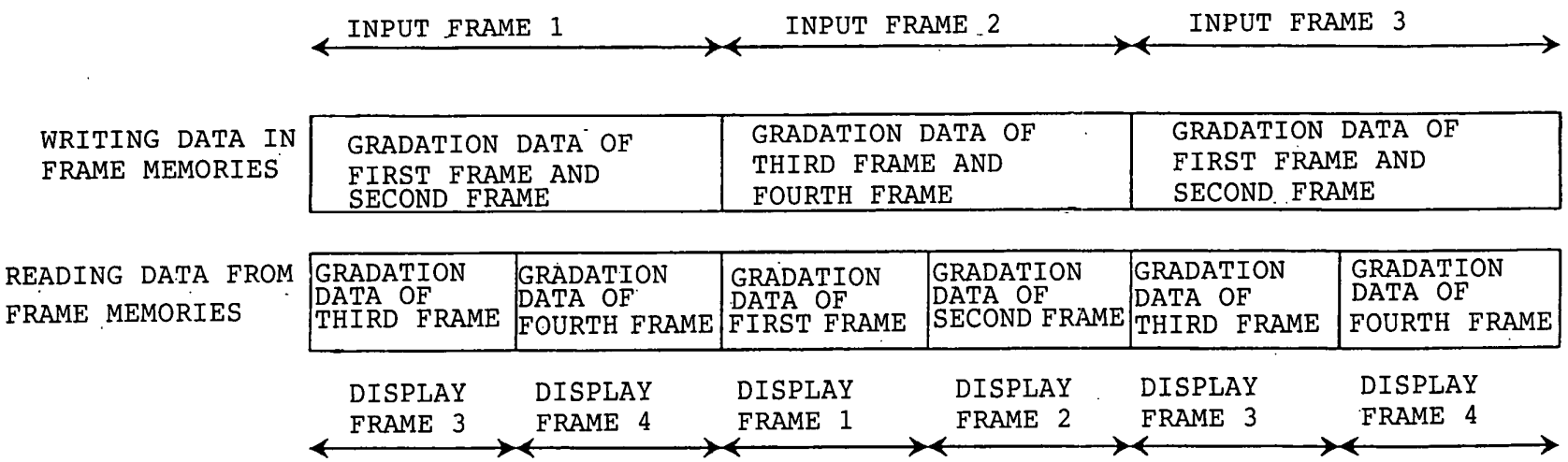


Fig. 19

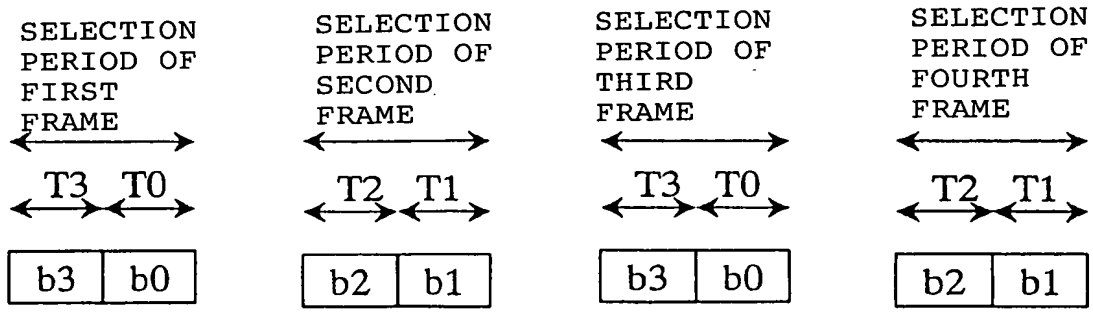

SELECTION PERIOD OF FIRST FRAME
T3
T0
b3
b0
SELECTION PERIOD OF SECOND FRAME
T2
T1
b2
b1
SELECTION PERIOD OF THIRD FRAME
T3
T0
b3
b0
SELECTION PERIOD OF FOURTH FRAME
T2
T1
b2
b1

Fig. 20

GRADATION NUMBER	f1		f2		f3		f4		GRADATION LEVEL
	T3	T0	T2	T1	T3	T0	T2	T1	
0	0	0	0	0	0	0	0	0	0 /44
1	0	1	0	0	0	0	0	0	1 /44
2	0	1	0	0	0	1	0	0	2 /44
3	0	0	0	1	0	0	0	0	3 /44
4	0	1	0	1	0	0	0	0	4 /44
5	0	1	0	1	0	1	0	0	5 /44
6	0	0	1	0	0	0	0	0	6 /44
7	0	1	1	0	0	0	0	0	7 /44
8	0	1	1	0	0	1	0	0	8 /44
9	0	0	1	1	0	0	0	0	9 /44
10	0	1	1	1	0	0	0	0	10 /44
11	0	1	1	1	0	1	0	0	11 /44
12	1	0	0	0	0	0	0	0	12 /44
13	1	1	0	0	0	0	0	0	13 /44
14	1	1	0	0	0	1	0	0	14 /44
15	1	0	0	1	0	0	0	0	15 /44
16	1	1	0	1	0	0	0	0	16 /44
17	1	1	0	1	0	1	0	0	17 /44
18	1	0	1	0	0	0	0	0	18 /44
19	1	1	1	0	0	0	0	0	19 /44
20	1	1	1	0	0	1	0	0	20 /44
21	1	0	1	1	0	0	0	0	21 /44
22	1	1	1	1	0	0	0	0	22 /44
23	1	1	1	1	0	1	0	0	23 /44
24	1	0	1	1	0	0	0	1	24 /44
25	1	1	1	1	0	0	0	1	25 /44
26	1	1	1	1	0	1	0	1	26 /44
27	1	0	1	1	0	0	1	0	27 /44
28	1	1	1	1	0	0	1	0	28 /44
29	1	1	1	1	0	1	1	0	29 /44
30	1	0	1	1	0	0	1	1	30 /44
31	1	1	1	1	0	0	1	1	31 /44
32	1	1	1	1	0	1	1	1	32 /44
33	1	0	1	1	1	0	0	0	33 /44
34	1	1	1	1	1	0	0	0	34 /44
35	1	1	1	1	1	1	0	0	35 /44
36	1	0	1	1	1	0	0	1	36 /44
37	1	1	1	1	1	0	0	1	37 /44
38	1	1	1	1	1	1	0	1	38 /44
39	1	0	1	1	1	0	1	0	39 /44
40	1	1	1	1	1	0	1	0	40 /44
41	1	1	1	1	1	1	1	0	41 /44
42	1	0	1	1	1	0	1	1	42 /44
43	1	1	1	1	1	0	1	1	43 /44
44	1	1	1	1	1	1	1	1	44 /44

Fig. 21

GRADATION NUMBER	f1		f2		f3		f4		GRADATION LEVEL
	T3	T0	T2	T1	T3	T0	T2	T1	
0	0	0	0	0	0	0	0	0	0 /46
1	0	1	0	0	0	0	0	0	2 /46
2	0	0	0	1	0	0	0	0	3 /46
3	0	1	0	0	0	1	0	0	4 /46
4	0	1	0	1	0	0	0	0	5 /46
5	0	0	1	0	0	0	0	0	6 /46
6	0	1	0	1	0	1	0	0	7 /46
7	0	1	1	0	0	0	0	0	8 /46
8	0	0	1	1	0	0	0	0	9 /46
9	0	1	1	0	0	1	0	0	10 /46
10	0	1	1	1	0	0	0	0	11 /46
11	1	0	0	0	0	0	0	0	12 /46
12	0	1	1	1	0	1	0	0	13 /46
13	1	1	0	0	0	0	0	0	14 /46
14	1	0	0	1	0	0	0	0	15 /46
15	1	1	0	0	0	1	0	0	16 /46
16	1	1	0	1	0	0	0	0	17 /46
17	1	0	1	0	0	0	0	0	18 /46
18	1	1	0	1	0	1	0	0	19 /46
19	1	1	1	0	0	0	0	0	20 /46
20	1	0	1	1	0	0	0	0	21 /46
21	1	1	1	0	0	1	0	0	22 /46
22	1	1	1	1	0	0	0	0	23 /46
23	1	0	1	1	0	0	0	1	24 /46
24	1	1	1	1	0	1	0	0	25 /46
25	1	1	1	1	0	0	0	1	26 /46
26	1	0	1	1	0	0	1	0	27 /46
27	1	1	1	1	0	1	0	1	28 /46
28	1	1	1	1	0	0	1	0	29 /46
29	1	0	1	1	0	0	1	1	30 /46
30	1	1	1	1	0	1	1	0	31 /46
31	1	1	1	1	0	0	1	1	32 /46
32	1	0	1	1	1	0	0	0	33 /46
33	1	1	1	1	0	1	1	1	34 /46
34	1	1	1	1	1	0	0	0	35 /46
35	1	0	1	1	1	0	0	1	36 /46
36	1	1	1	1	1	1	0	0	37 /46
37	1	1	1	1	1	0	0	1	38 /46
38	1	0	1	1	1	0	1	0	39 /46
39	1	1	1	1	1	1	0	1	40 /46
40	1	1	1	1	1	0	1	0	41 /46
41	1	0	1	1	1	0	1	1	42 /46
42	1	1	1	1	1	1	1	0	43 /46
43	1	1	1	1	1	0	1	1	44 /46
44	1	1	1	1	1	1	1	1	46 /46

Fig. 22

EXAMPLE	TIME RATIO
1	4 : 3 (75%)
2	9 : 6 (67%)
3	6 : 4 OR 6 : 5 (67% OR 83%)
4	13 : 9 OR 14 : 9 (69% OR 64%)

Fig. 23

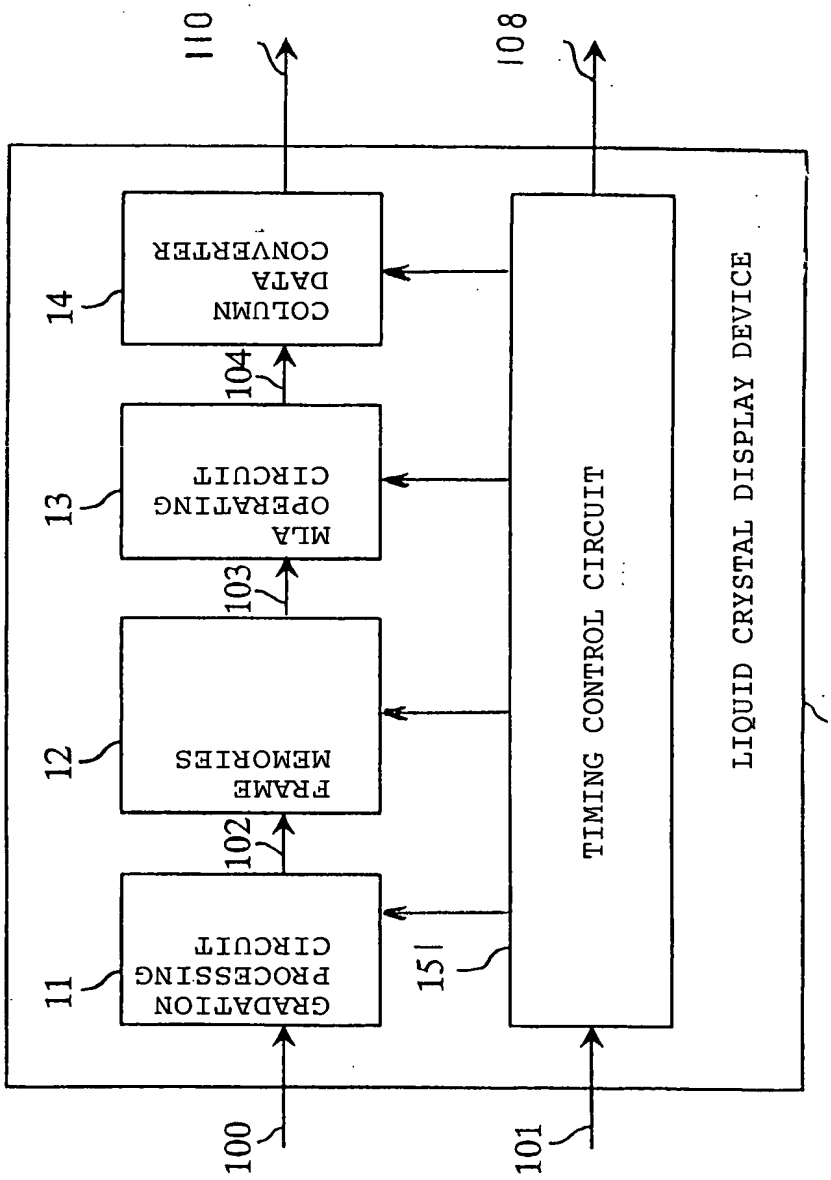

110
108
LIQUID CRYSTAL DISPLAY DEVICE
20
TIMING CONTROL CIRCUIT
151
COLUMN DATA CONVERTER
14
MLA OPERATING CIRCUIT
13
FRAME MEMORIES
12
GRADATION PROCESSING CIRCUIT
11
104
103
102
100
101

Fig. 24

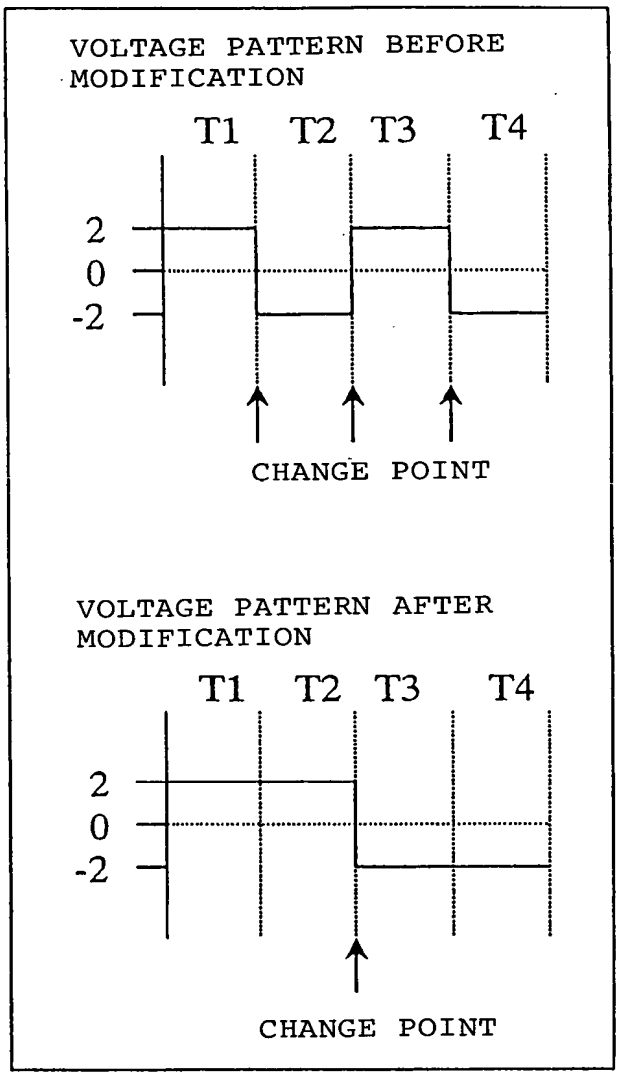

VOLTAGE PATTERN BEFORE MODIFICATION
T1
T2
T3
T4
2
0
-2
CHANGE POINT
VOLTAGE PATTERN AFTER MODIFICATION
T1
T2
T3
T4
2
0
-2
CHANGE POINT

Fig. 25

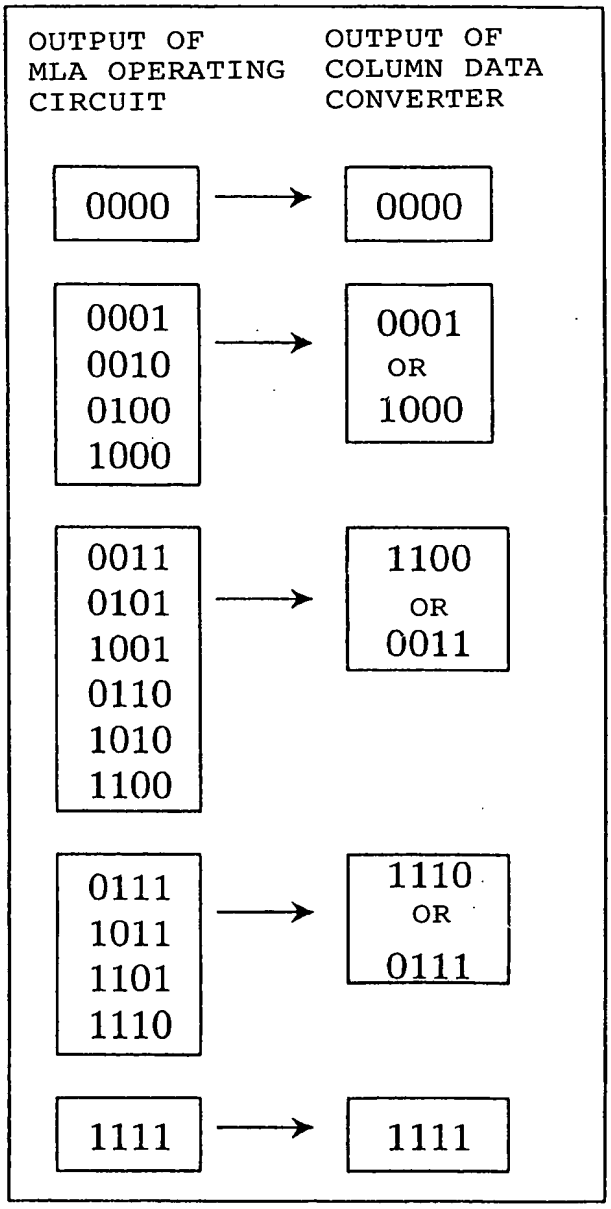

OUTPUT OF MLA OPERATING CIRCUIT
OUTPUT OF COLUMN DATA CONVERTER
0000
0000
0001
0010
0100
1000
0001
OR
1000
0011
0101
1001
0110
1010
1100
1100
OR
0011
0111
1011
1101
1110
1110
OR
0111
1111
1111

Fig. 26

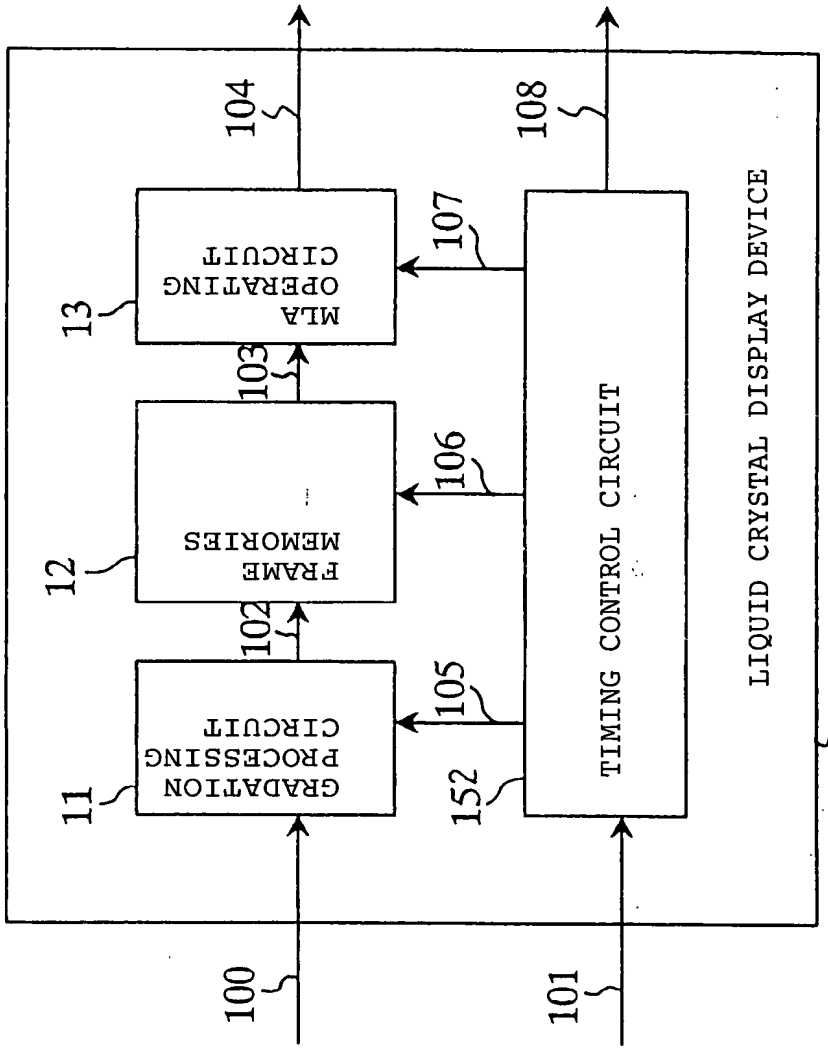
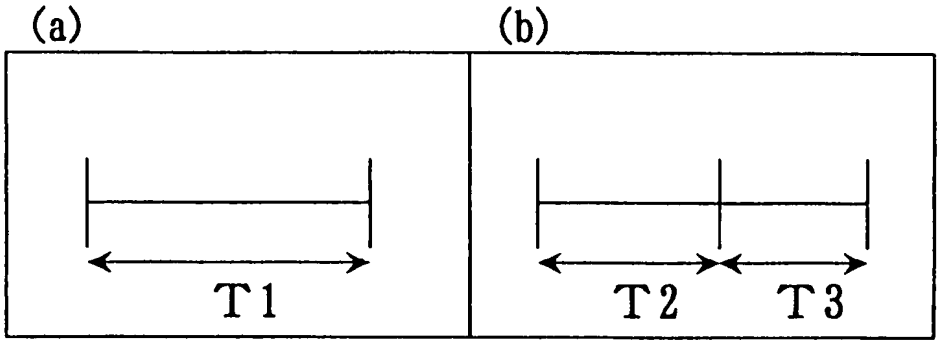

LIQUID CRYSTAL DISPLAY DEVICE
30
GRADATION PROCESSING CIRCUIT
11
FRAME MEMORIES
12
MLA OPERATING CIRCUIT
13
TIMING CONTROL CIRCUIT
152
100
101
102
103
104
105
106
107
108

Fig. 27



T1:T2:T3=4:3:2

Fig. 28

VOLTAGE LEVEL	T1	T2	T3	Vrms
0	0	0	0	0.91
2	0	0	1	0.93
3	0	1	0	0.94
4	1	0	0	0.95
5	0	1	1	0.96
6	1	0	1	0.97
7	1	1	0	0.98
9	1	1	1	1

Vrms: STANDARDIZED BASED ON ON

Fig. 29

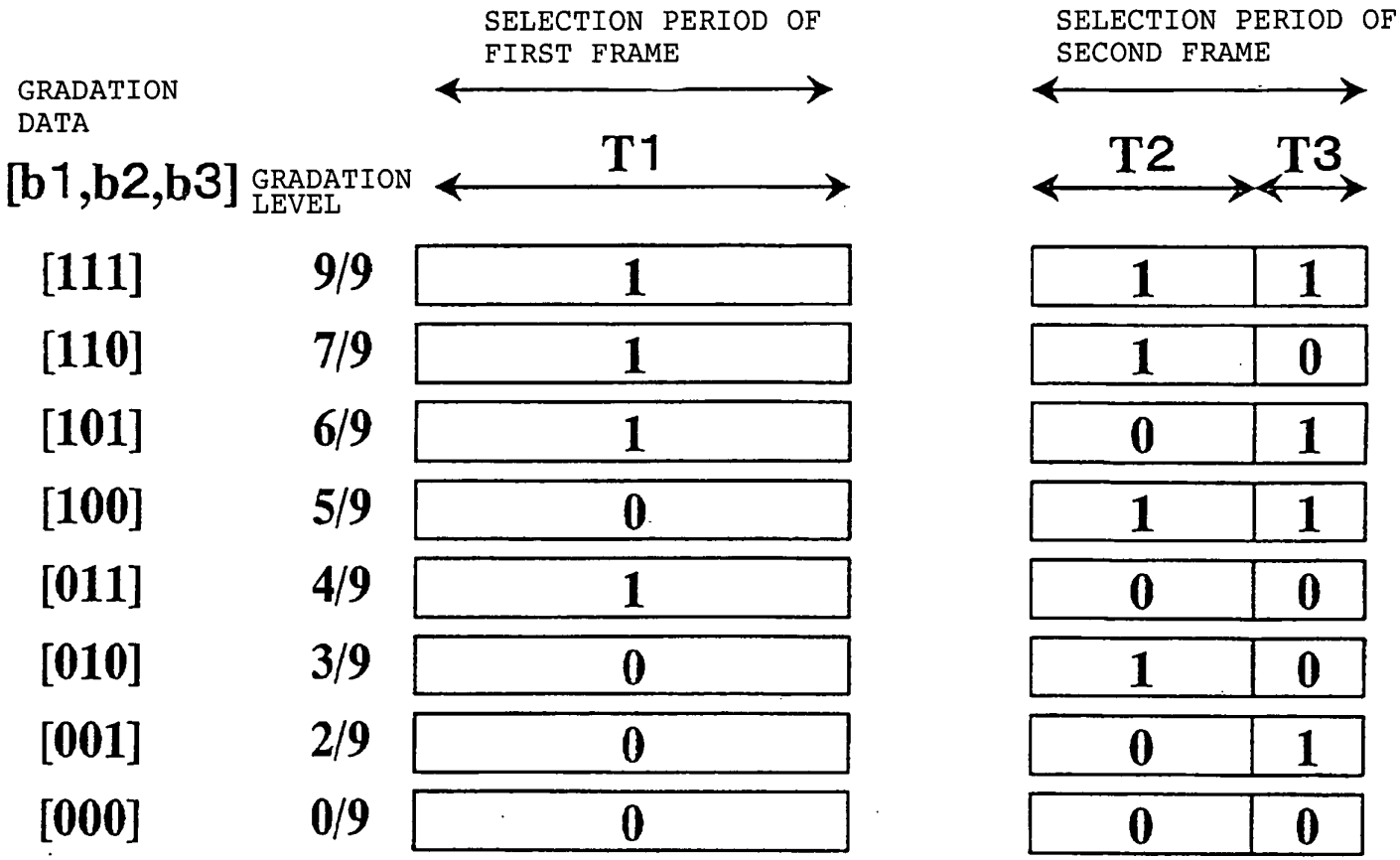
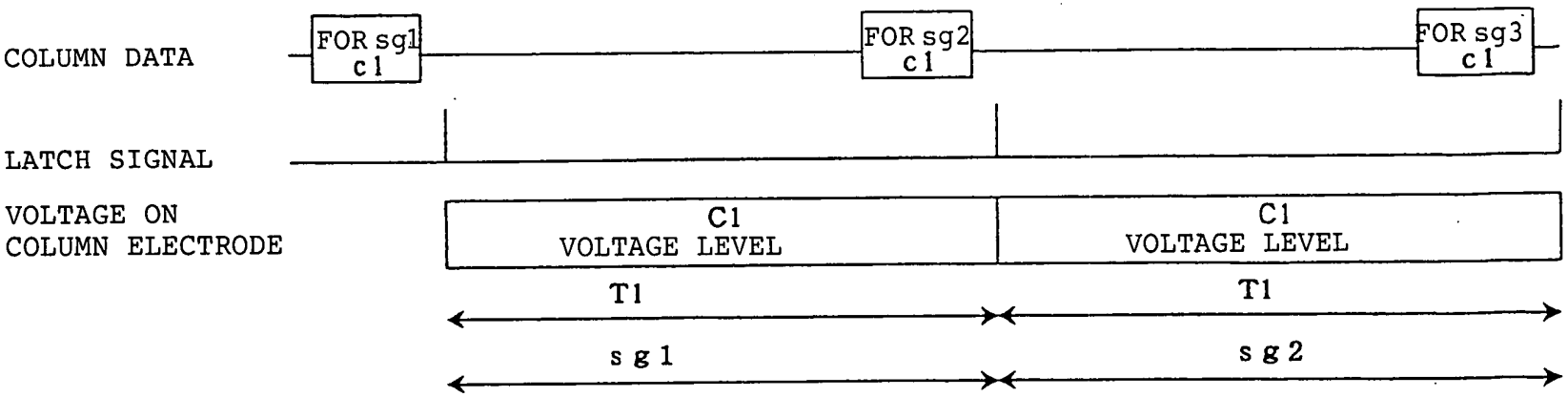


Fig. 30

(TIMING OF LATCH SIGNAL IN FIRST FRAME)



(TIMING OF LATCH SIGNAL IN SECOND FRAME)

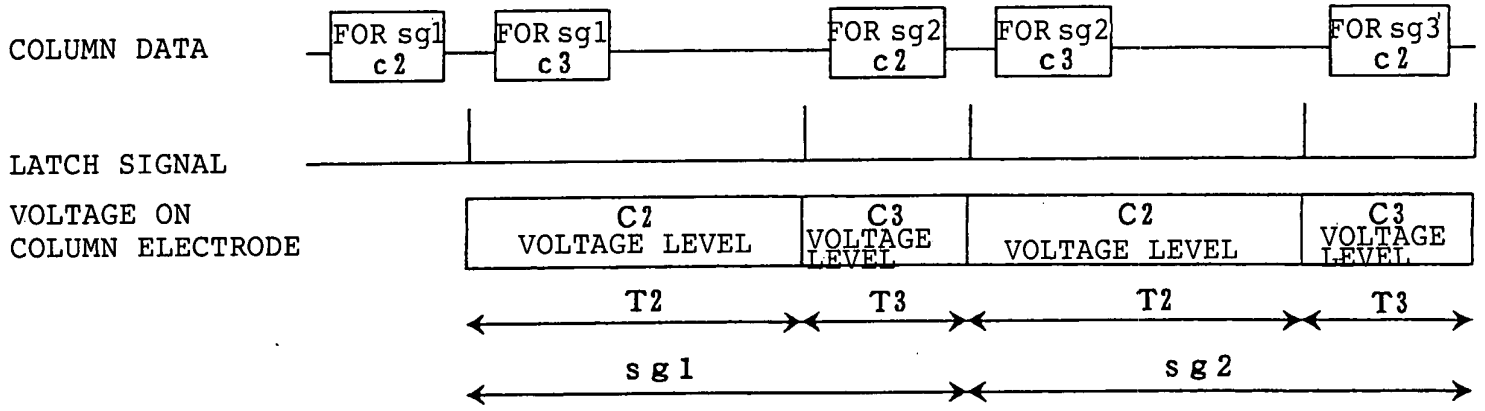
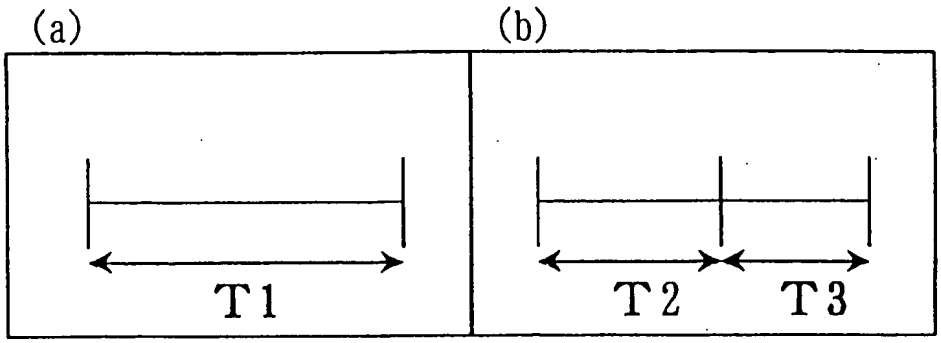


Fig. 31



T1:T2:T3=5:3:2

Fig. 32

VOLTAGE LEVEL	T1	T2	T1	T2
0	0	0	0	0
2	0	0	1	0
3	0	0	0	1
4	1	0	1	0
5	0	0	1	1
6	0	1	0	1
7	1	0	1	1
8	0	1	1	1
10	1	1	1	1

T1:T2=2:3

Fig. 33

	T1	T2	T3	T1	T2	T3
0	0	0	0	0	0	0
2	0	0	0	0	0	1
3	0	0	0	0	1	0
4	0	0	1	0	0	1
5	0	0	0	0	1	1
6	0	0	0	1	0	0
7	0	0	1	0	1	1
8	0	0	0	1	0	1
9	0	0	0	1	1	0
10	0	0	1	1	0	1
11	0	0	0	1	1	1
12	0	1	0	1	1	0
13	0	0	1	1	1	1
14	0	1	0	1	1	1
15	1	0	0	1	1	0
16	0	1	1	1	1	1
17	1	0	0	1	1	1
18	1	1	0	1	1	0

	T1	T2	T3	T1	T1	T3
19	1	0	1	1	1	1
20	1	1	0	1	1	1
22	1	1	1	1	1	1

T1:T2:T3=6:3:2

Fig. 34

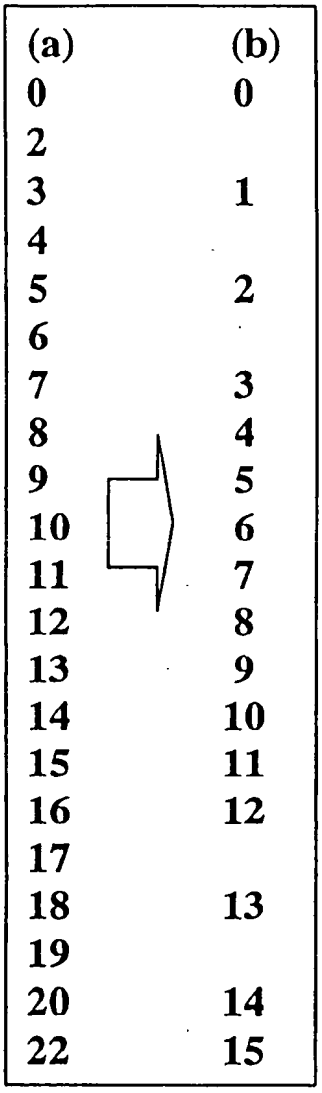

(a)
(b)
0
0
2
3
1
4
5
2
6
7
3
8
4
9
5
10
6
11
7
12
8
13
9
14
10
15
11
16
12
17
18
13
19
20
14
22
15

Fig. 35

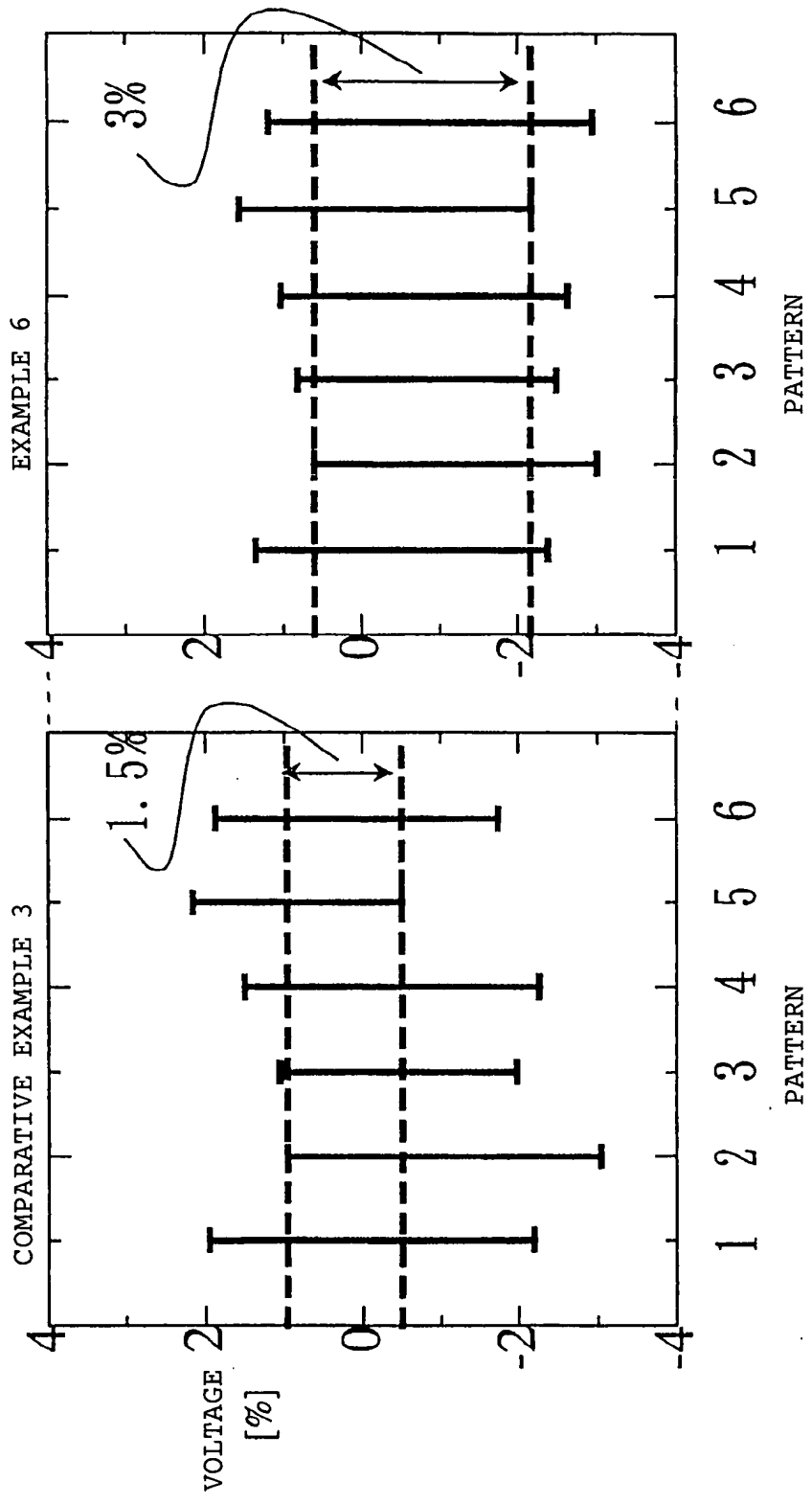
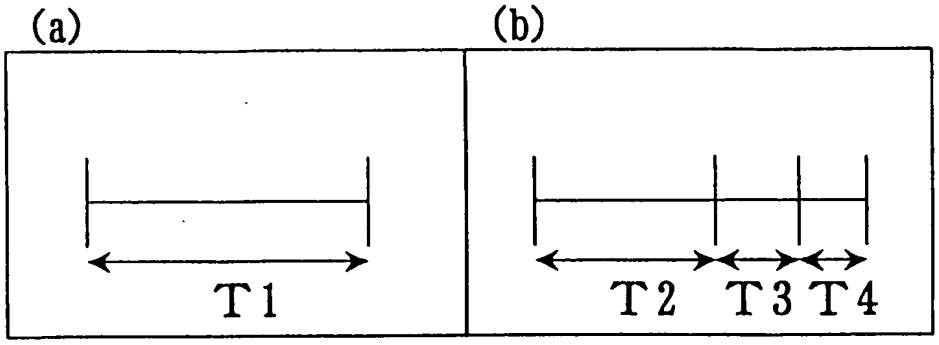

COMPARATIVE EXAMPLE 3
EXAMPLE 6
1.5%
3%
VOLTAGE [%]
4
2
0
-2
-4
1 2 3 4 5 6
PATTERN

Fig. 36

IMAGE NUMBER	TITLE	CONTENTS
1	BIKE RACING	AN IMAGE OF A MOTOR BIKE FOR RACING WHICH IS COLORED WITH WHITE AND RED AS BASIC COLORS, THE MOTOR BIKE BEING CONTRASTED WITH A COLOR FOR THE GROUND
2	NIGHT SCENE	AN IMAGE OF THE DARKEST SCENE
3	ALPS	A SCENE OF A SNOW MOUNTAIN IN A BLUE SKY
4	AIRPLANE	AN IMAGE OF A RELATIVELY BRIGHT OBJECT
5	RAIL COASTER	AN IMAGE OF A RAIL COASTER IN A BACKGROUND OF CLOUD
6	LABORATORY	AN IMAGE OF A MAN IN A DARK ROOM

Fig. 37



T1:T2:T3:T4=12:6:3:2

Fig. 38

(a)		(b)	
0	24	0	16
2	25		17
3	26	1	18
4	27		19
5	28		20
6	29	2	21
7	30		22
8	31		23
9	32	3	24
10	33		25
11	34	4	26
12	35		27
13	36	5	
14	37	6	28
15	38	7	
16	39	8	
17	40	9	29
18	41	10	
19	42	11	
20	43	12	30
21	44	13	
22	46	14	31
23		15	

Fig. 39

(TIME RATIO)

VOLTAGE LEVEL	1	2	4	8
0	0	0	0	0
1	1	0	0	0
2	0	1	0	0
3	1	1	0	0
4	0	0	1	0
5	1	0	1	0
6	0	1	1	0
7	1	1	1	0
8	0	0	0	1
9	1	0	0	1
10	0	1	0	1
11	1	1	0	1
12	0	0	1	1
13	1	0	1	1
14	0	1	1	1
15	1	1	1	1

Fig.40A

(VOLTAGE LEVEL)	(GRADATION LEVEL)
0 16 32 48	0 18
1 17 33 49	3 19
2 18 34 50	4 20 30
3 19 35 51	5 21
4 20 36 52	6 22
5 21 37 53	7 23
6 22 38 54	8 24
7 23 39 55	1 9 25
8 24 40 56	10 26
9 25 41 57	11 27
10 26 42 58	12 28
11 27 43 59	13
12 28 44 60	14 29 31
13 29 45 61	15
14 30 46 62	2 16
15 31 47 63	17

Fig. 40B

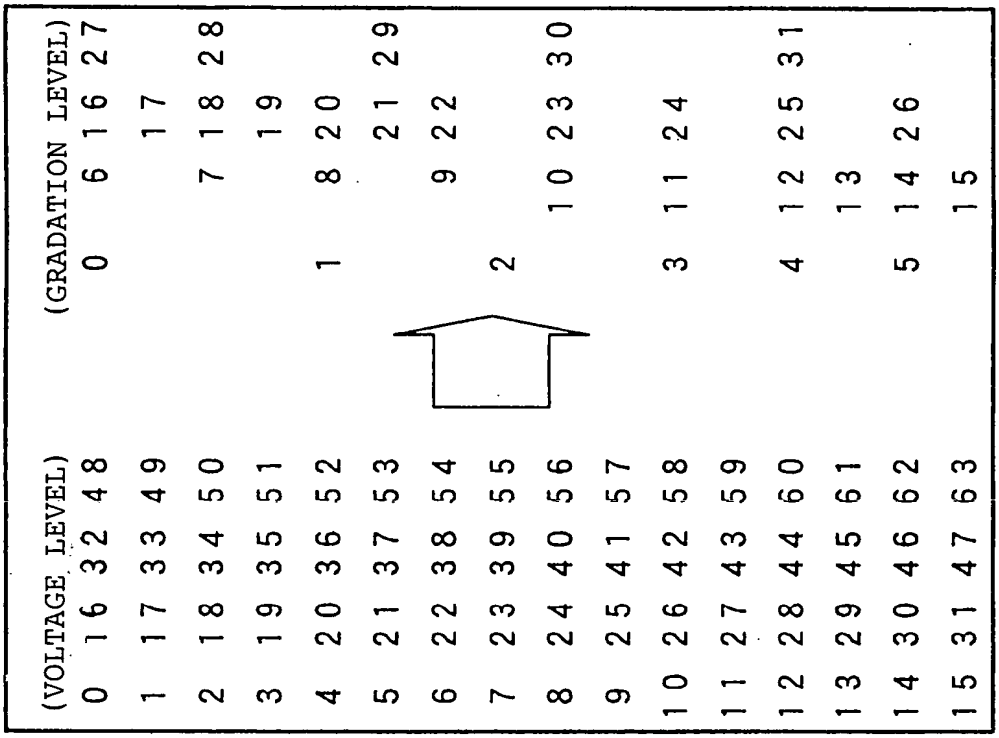

(VOLTAGE LEVEL)
(GRADATION LEVEL)
0 16 32 48 0 6 16 27
1 17 33 49 17
2 18 34 50 7 18 28
3 19 35 51 19
4 20 36 52 1 8 20
5 21 37 53 21 29
6 22 38 54 9 22
7 23 39 55 2
8 24 40 56 10 23 30
9 25 41 57
10 26 42 58 3 11 24
11 27 43 59
12 28 44 60 4 12 25 31
13 29 45 61 13
14 30 46 62 5 14 26
15 31 47 63 15

Fig. 41